ABSTRACT

High Field Superconducting Magnets
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The post-SSC period has seen a renewed interest in high field dipole development, i,e, for fields greater than 10 T, which is the practical limit for NbTi. A number of groups have active programs in this area, including BNL, FNAL, KEK, LASA/INFN, LBNL, TAMU, and Twente U. Potential high energy physics applications for magnets in this field range include a Very Large Hadron Collider, a Muon Collider, or upgrades to the LHC. While most of these programs are in the early development stages, several significant results have been demonstrated. These include the Twente U. dipole which reached a field of 11.0 T in 1995 and the LBNL dipole which reached a new world record dipole field of 13.5 T in 1997. While these two magnets were based on the cosine theta coil winding approach, much recent work has been focused on block coil designs that may be more compatible with the brittle superconductors and high Lorentz loads that are inherent difficulties for high field magnets. The new block coil designs include "common coil" designs being developed at BNL and LBNL, and a segmented block design with reduced winding stresses at TAMU. In addition to the magnet design work, several new superconductors are being developed for use in high field accelerator magnets. These include Nb3Al as well as HTS conductors in both tape and cable configurations. The status and prospects of both magnet and conductor development for higher field accelerator magnets will be reviewed.